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ADVISORY ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1, 5, 7-8, 11-12, 14-22 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Jacobus 5769640 in view of Rice 6310619.

Re claim 1, Jacobus discloses a method for generating a virtual anatomic environment for use in a computer based visual simulation of minimally invasive surgery (column 2 lines 22-29), comprising providing a main virtual anatomic environment (column 4 lines 10-19), all of the local anatomic environments of the library being separately modeled three-dimensional models each representing an individual anatomic variation in a local internal area of a living being (column 7 lines 6-9 and column 10 lines 27-29), and selecting a local anatomic environment from a predefined library comprising a set of two or more local anatomic environments (column 3 lines 57-67).

Jacobus discloses all of the claimed subject matter as discussed above with the exception of disclosing the feature of the selection of different combinations of selected local anatomic environments in said main virtual anatomic environment thereby allowing generation of different virtual environments, each different virtual environment representing anatomic variations occurring in living beings including the selected local

anatomic environment in said main virtual anatomic environment to form said virtual anatomic environment.

However, Rice teaches the selection of different combinations of selected local anatomic environments in said main virtual anatomic environment thereby allowing generation of different virtual environments, each different virtual environment representing anatomic variations occurring in living beings including the selected local anatomic environment in said main virtual anatomic environment to form said virtual anatomic environment, (column 2 lines 65-67, column 3 lines 1-36 and column 12 lines 9-11).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Jacobus's invention by incorporating Rice's teaching in order to provide a computer-implemented virtual reality, tissue-specific body model that increases the efficiency and accuracy of anatomical study in an environment having user-variable physical and environmental properties as taught by Rice (column 3 lines 37-40).

Re claim 5, Jacobus in view of Rice discloses all of the claimed subject matter as discussed above. In addition, Rice teaches the main virtual anatomic environment is arranged to model an internal cavity of a human and the set of local anatomic environments is arranged to simulate different arrangements of arteries, veins and ducts around an organ arranged in internal cavity (column 5 lines 1-29 and column 12 lines 6-14).

Re claim 7, Jacobus discloses a device for generating a virtual anatomic environment for use in a computer based visual simulation of minimally invasive surgery (column 2 lines 22-29), a library comprising a set of two or more local anatomic environments, all of the local anatomic environments of the library being separately modeled three-dimensional models each representing an individual anatomic variation in a local internal area of a living being (column 7 lines 6-9 and column 10 lines 27-29).

Jacobus discloses all of the claimed subject matter as discussed above with the exception of disclosing the feature of a modeling device for providing a main virtual anatomic environment and means for incorporating one of the local anatomic environments of the library into the main virtual anatomic environment, together forming said virtual anatomic environment, thereby allowing generation of different virtual environments, each different virtual environment representing anatomic variations occurring in living beings.

However, Rice teaches a modeling device for providing a main virtual anatomic environment (column 5 lines 30-45), means for incorporating one of the local anatomic environments of the library into the main virtual anatomic environment, together forming said virtual anatomic environment, thereby allowing generation of different virtual environments, each different virtual environment representing anatomic variations occurring in living beings (column 5 lines 46-67).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Jacobus's invention in view of Rice in order to provide a computer-implemented virtual reality, tissue-specific body model that increases the

efficiency and accuracy of anatomical study in an environment having user-variable physical and environmental properties as taught by Rice (column 3 lines 37-40).

Re claim 8, Jacobus in view of Rice discloses all of the claimed subject matter as discussed above. In addition, Rice teaches a selection device for selecting one of local anatomic environments from library to be included in virtual anatomic environment (column 6 lines 62-67 and column 7 lines 1-7).

Re claim 11, Jacobus in view of Rice discloses all of the claimed subject matter as discussed above. In addition, Rice teaches the main virtual anatomic environment is arranged to model an internal cavity of a human (column 12 lines 6-14), the set of local anatomic environments is arranged to simulate different arrangements of arteries, veins and ducts around an organ arranged in internal cavity (column 5 lines 1-12).

Re claim 12, Jacobus in view of Rice discloses all of the claimed subject matter as discussed above. In addition, Rice teaches a device for generating a virtual anatomic environment (column 5 lines 30-45).

Re claims 14 and 15, Jacobus in view of Rice discloses all of the claimed subject matter as discussed above. In addition, Jacobus discloses selecting a certain local anatomic environments from the library and including it into main virtual anatomic environment by user selection (column 3 lines 57-67).

Re claim 16, Jacobus in view of Rice discloses all of the claimed subject matter as discussed above. In addition, Rice teaches the main virtual anatomic environment is arranged to model an internal cavity of a human (column 12 lines 6-14), the set of local

anatomic environments is arranged to simulate different arrangements of arteries, veins and ducts around an organ arranged in internal cavity (column 5 lines 1-12).

Re claims 17 and 18, Jacobus in view of Rice discloses all of the claimed subject matter as discussed above. In addition, Rice teaches the main virtual anatomic environment is arranged to model an internal cavity of a human (column 12 lines 6-14), the set of local anatomic environments is arranged to simulate different arrangements of arteries, veins and ducts around an organ arranged in internal cavity (column 5 lines 1-12).

Re claims 19 and 20, Jacobus in view of Rice discloses all of the claimed subject matter as discussed above. In addition, Rice teaches a device for generating a virtual anatomic environment (column 5 lines 30-45).

Re claims 21 and 22, Jacobus in view of Rice discloses all of the claimed subject matter as discussed above. In addition, Rice discloses components included in the local anatomic environment are excluded in the main virtual anatomic environment (column 7 lines 3-7).

3. Claims 3-4, 6, 9-10 and 13 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Jacobus 5769640 in view of Rice 6310619 and further in view of Ramshaw 5791907.

Re claim 3, Jacobus in view of Rice discloses all of the claimed subject matter as discussed above with the exception of disclosing the feature of randomly selecting one of the local anatomic environments in the library.

However, Ramshaw teaches randomly selecting one of the local anatomic environments in the library (column 17 lines 9-12).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Jacobus in view of Rice invention and further in view of Ramshaw in order to provide a cost-effective and quality medical training including an interactive user environment for surgical procedure as taught by Ramshaw (column 2 lines 50-52).

Re claim 4, Jacobus in view of Rice discloses all of the claimed subject matter as discussed above with the exception of disclosing the feature of the probability of randomly selecting a certain local anatomic environment essentially corresponds with the degree of occurrence of that local anatomic environment in living beings.

However, Ramshaw teaches the probability of randomly selecting a certain local anatomic environment essentially corresponds with the degree of occurrence of that local anatomic environment in living beings (column 17 lines 9-31).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Jacobus in view of Rice invention and further in view of Ramshaw in order to provide a cost-effective and quality medical training including an interactive user environment for surgical procedure as taught by Ramshaw (column 2 lines 50-52).

Re claim 6, Jacobus in view of Rice and further in view of Ramshaw discloses all of the claimed subject matter as discussed above. In addition, Ramshaw teaches

selecting a certain local anatomic environments from the library and including it into main virtual anatomic environment by user selection (column 17 lines 25-31).

Re claim 9, Jacobus in view of Rice and further in view of Ramshaw discloses all of the claimed subject matter as discussed above. In addition, Ramshaw teaches randomly select one of local anatomic environments from the library to be included in virtual anatomic environment (column 17 lines 9-12).

Re claim 10, Jacobus in view of Rice and further in view of Ramshaw discloses all of the claimed subject matter as discussed above. In addition, Ramshaw teaches randomly select one of local anatomic environments in a way that the probability of selecting a certain local anatomic environment essentially corresponds with the degree of occurrence of that local anatomic environment in human beings (column 17 lines 25-31).

Re claim 13, Jacobus in view of Rice and further in view of Ramshaw discloses all of the claimed subject matter as discussed above. In addition, Ramshaw teaches randomly selecting one of the local anatomic environments in the library (column 17 lines 9-12).

Response to Arguments

4. In response to the applicant's arguments that Jacobus in view of Rice does not disclose the "selecting a local anatomic environment from a predefined library comprising a set of two or more local anatomic environments, all of the local anatomic environments of the library being separately modeled three-dimensional models each representing an individual anatomic variation in a local internal area of a living being,"

and "the selection of different combinations of selected local anatomic environments in said main virtual anatomic environment thereby allowing generation of different virtual environments," the Examiner disagrees. Jacobus discloses a methods and systems for simulating medical procedures specifically endoscopic medical procedures (column 3 lines 51-67), a systematic scanning of anatomical features is performed to support the generation of data and images to accommodate various user inputs for any particular surgery performed (using a graphics/image processing engine and storage module capable of real-time medical image generation)… the systematic scanning of anatomical features using the scope to generate a complete imagery record of organ and tissue orientation surrounding the site of medical simulation. This supports generation of in-between data and interpolated views based on recorded data (column 4 lines 64-67 and column 5 lines 1-19). In addition, Jacobus discloses “FIG. 8 shows a control concept for creating the feel of medical instruments during a simulation. The hands 120 of a surgeon or trainee grasp and move a member representative of an instrument. The position of the instrument 122 is determined and fed into a geometric model of an organ 124. The geometric model 124 includes data representing the organ size, position, surface characteristics (in terms of elasticity, resistance to searing, slipperiness, etc.). Forces and torques are applied to the surgeon's/trainee's hands 120 from a force/torque subsystem 126 using data from the geometric model 124. Thus, realistic feels are produced on the simulated medical instrument representing instrument-to-organ interaction forces based on the position of the instrument (column 7 lines 1-14 and column 10 lines 27-29), and “storing geometrical model of an organ in a

database including the size, position, and one or more surface characteristics associated therewith" in claim 19. Furthermore, Jacobus discloses "The virtual reality training system uses images and data in the simulation database (or model-base) to allow a trainee to explore this data (library of anatomic environment or collection of complete imagery record of organs and tissues orientation surrounding the site of medical simulation). The trainee can view, hear, and feel operations through manipulation and positioning of the simulated instruments, or based on his head location. Images or data not in the simulation database are generated through interpolation between images/data items which are in the database (interpolation between images is accomplished through morphing mapping predetermined image polygons between images) (column 6 lines 2-10).

Moreover, Rice does not disclose "one-model" or "a single overall model". Rice discloses a three-dimensional, virtual reality, tissue specific model of a human (including organs) that provides a high level of user-interactivity. The model functions can be analyzed and user-modified on a tissue-by-tissue basis, thereby allowing modeling of a wide variety of normal and abnormal tissue attributes and corresponding study thereof" (see abstract). Rice discloses providing a computer implemented model of an entire human body which includes a high level of tissue-specific detail. The model is animated by the computer on a display in three-dimensional virtual reality. Virtual reality provides a way for humans to visualize, manipulate and interact with computers and extremely complex data. The virtual reality model according to the invention performs realistic movements and has realistic reaction to simulated events. Advantageously, the model

is not static, but responds to user input variation of model attributes/parameters to provide a high level of real-time user-interactivity. The user can modify specific model attributes on a tissue-by-tissue basis to observe various outcomes using inverse kinematics. User input can be provided by a variety of means to modify the virtual model instantaneously (column 3 lines 51-67, column 6 1-67 and column 7 lines 1-17).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Jacobus by incorporating Rice's teaching of a three-dimensional, virtual reality, tissue specific model of a human body which provides a high level of user-interactivity. The model functions can be analyzed and user-modified on a tissue-by-tissue basis, thereby allowing modeling of a wide variety of normal and abnormal tissue attributes and corresponding study thereof. The model can be user-modified through a keyboard, or other VR tools such as a haptic interface in order to provide a computer-implemented, tissue-specific model of a body which increases the efficiency and accuracy of anatomical study.

5. In response to the applicant's arguments that Jacobus in view of Rice does not disclose the "modeling local anatomical environments each representing an individual anatomic variation in a local internal area of a living being", the Examiner disagrees. Jacobus discloses both recording medical procedure and modeling by utilizing a 3D graphics generator that generate and store the geometric model representing a complete imagery record of organs and tissues orientation surrounding the site of medical simulation (e.g. organ size, position, surface characteristics in terms of

elasticity, resistance to searing, slipperiness, etc.) (column 6 lines 2-10 and column 7 lines 1-14 and claim 19).

6. In response to the applicant's arguments that Jacobus in view of Rice does not disclose "components included in the local anatomic environment are excluded in the main virtual anatomic environment", the Examiner disagrees. Jacobus discloses both recording medical procedure and modeling by utilizing a 3D graphics generator that generate and store the geometric model representing a complete imagery record of organs and tissues orientation surrounding the site of medical simulation (e.g. organs and tissues size, position, surface characteristics etc.) (column 6 lines 2-10 and column 7 lines 1-14 and claim 19). In addition, Rice discloses a dynamic three-dimensional virtual anatomical model of human that responds to user input variation of model attributes/parameters to provide a high level of real-time user-interactivity. The user can modify specific model attributes (e.g. modify a particular organ) on a tissue-by-tissue basis to observe various outcomes using inverse kinematics. User input can be provided by a variety of means to modify the virtual model instantaneously (column 3 lines 51-67), the virtual anatomical model need not be limited to the somatic structure and could be extended to include visceral organs and all other tissues of the human anatomy (column 12 lines 9-14).

For example, the training simulation is for endoscopic medical procedure "cholecystectomies" involving gallbladder. This particular simulation will not show/display or exclude from presentation other organs or tissues (e.g. heart, lungs, etc) that are not related to this specific medical procedure.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Jacobus by incorporating Rice's teaching of a three-dimensional, virtual reality, tissue specific model of a human body which provides a high level of user-interactivity in order to provide a simulation of a complete imagery record of organs and tissues orientation surrounding the site of medical simulation (exluding organs or tissues that are not involve for a particular medical procedures) increases the efficiency and accuracy of anatomical study.

7. In response to the applicant's arguments that Jacobus in view of Rice in view of Ramshaw does not disclose "randomly selecting one of the local anatomic environments in the library" and "the probability of randomly selecting a certain local anatomic environment essentially corresponds with the degree of occurrence of that local anatomic environment in living beings", the Examiner disagrees. Jacobus in view of Rice discloses all of the claimed subject matter as discussed above. In addition, Ramshaw teaches programmed to simulate random and unexpected errors (training procedures) and similar random errors may be placed throughout the various steps of the procedure to better illustrate potential problems and how to deal with those problems at all points in the procedure (column 7 lines 9-31). These random errors are simulated on a random selection of anatomical area (e.g. surroundings of medical simulation including tissues and organs) during the specific medical procedures. In addition, it is well known in the art of computer-based education or training that one of items is randomly selected. Hence, in the invention disclosed in Jacobus in view of Rice, it is readily conceivable to randomly select one of virtual models during training.

/Cameron Saadat/

Primary Examiner, Art Unit 3715